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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,008	08/29/2001	Mamoru Hosoya	09792909-5150	9014

26263 7590 09/08/2004

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT PAPER NUMBER

1745

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,008

Applicant(s)

HOSOYA ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/17/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-9, 11-14 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-9, 11-14 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/17/2004 has been entered.

Response to Amendment

2. This Office Action is responsive to the amendment filed on 5/17/2004. Claims 1-6, 10, and 15 have been cancelled. Claims 7 and 12 have been amended. Previous art rejections based on Prosini et al. are withdrawn in view of applicant's amendment to claims 7 and 12. Claims 7-9, 11-14, and 16-18 are pending and are rejected for reasons given below.

Specification

3. The disclosure is objected to because of the following informalities:

On page 17 of the specification, the compound $(\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O})$ is incorrectly referred to as a hydride instead of a hydrate.

Appropriate correction is required.

Claim Objections

4. Claims 7 and 12 are objected to because of the following informalities:

In claims 7 and 12, the chemical formula $(\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O})$ is incorrectly referred to as a hydride instead of a hydrate.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7-9, 11-14, and 16-18 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Barker et al. (US 6,528,033 B1).

Barker et al. disclose a nonaqueous electrolyte cell having a cathode including a cathode active material with the formula LiFePO_4 and a carbon material with a carbon content of 4.7 weight percent based on a molecular weight of LiFePO_4 given as 157 g/mole and assuming complete reaction in example 1 producing 1 mol LiFePO_4 and 12 g of carbon and a powder density of 3.6 g/cm^3 (see Figure 1; col. 7, lines 45-53; and col. 14, lines 15-47; col. 18, lines 36-67). Barker et al. also disclose that during cycling, the x quantity of lithium is released where $0 \leq x \leq 1$ in the case of LiFePO_4 as is also known to one of ordinary skill in the art (col. 2, lines 29-46). The nonaqueous cell also includes an anode including an anode active material, a nonaqueous electrolyte and a separator film and a nonaqueous solution based electrolyte (col. 7, lines 54-65). The separator can also be polymeric electrolyte (col. 13, lines 1-45).

The method of producing the cathode active material includes providing the starting materials in particle form that comprise of a lithium containing compound, one or more metal containing compounds, a compound capable of providing the phosphate anion, and carbon powder (col. 3, lines 61-67). The starting materials are mixed together with carbon such that the carbon is intimately mixed with the product active material (col. 4, lines 4-25). The starting materials are mixed and dry ground with a ball mill for about 30 minutes and pressed into a pellet (col. 4, lines 30-35) before sintering (heating) the material from 750 to 800 °C in a non-

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oxidizing atmosphere (col. 6, lines 5-17 and col. 11, lines 5-34). Barker et al. disclose that LiFePO_4 can be synthesized from Li_3PO_4 and $\text{Fe}_3(\text{PO}_4)_2$ (col. 15, lines 25-45) which reads on the instant claims when $n = 0$ for the number of water molecules in the iron phosphate starting material. Applicant did not claim values for n and the Examiner in this instance interprets that n can be zero.

It is noted that applicants of the present invention added 3 weight % of acetylene black powders based on the entire weight of the fired product (see page 20 of applicant's specification). It is noted that in Barker et al., the carbon material is 6 weight percent of the entire weight of the starting product mixture that is fired which is 100% excess of the carbon used (see col. 14, lines 15-46) such that the fired product must contain at least 3 weight percent carbon (corresponding to the 100% excess).

The cathode prepared contains 85% by weight of active material, 10% by weight percent carbon black, and 5 % by weight binder (col. 18, lines 36-67). It is noted that carbon black is also added to the fired product.

Barker et al. does not explicitly disclose that the carbon material in the cathode is a material that has a Raman spectrum characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1} such that the ratio of the peak area of the first peak to the peak area of the second peak respectively is greater than or equal to 0.30.

It is noted that the carbon material of Barker et al. was subjected to heating and grinding (ball milling) in the method of making the cathode material as stated above. The carbon material of the prior art was ground by ball milling and sintered at 750 to 800 °C which is similar to the

conditions under which the carbon material was treated in applicants' invention as disclosed on page 20 and 21 of the specification. It is noted that applicants added 3 weight % of acetylene black powders based on the entire weight of the fired product (see page 20 of applicant's specification). It is noted that the carbon material is 6 weight percent of the entire weight of the starting product mixture that is fired which is 100% excess of the carbon used (see *col. 14, lines 15-46*) such that the fired product must contain at least 3 weight percent carbon (corresponding to the 100% excess). Therefore, the carbon material that is sintered in the cathode material of Barker et al. inherently has a Raman spectrum that is characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1} such that the ratio of the peak area of the first peak to the peak area of the second peak is greater than or equal to 0.30. The initial discharge capacity of the battery of Barker et al. is 121 mAh/g (see Figure 2 and *col. 19, lines 5-26*) which is comparable to the values of the initial discharge capacity of the battery of the instant invention when the ratio of A as defined in the instant claims is greater than 0.3 (see Table 3, page 39 of applicants' specification).

Since the same electrode active material is used, the same amount of carbon, and the same density of the active material is used, and similar discharge capacity is obtained by the battery containing the cathode active material of Barker et al. , the carbon material in the cathode of Barker et al. including the carbon black added to the active material is expected to have a Raman spectrum that is characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1} such that the ratio of the peak area of the first peak to the peak area of the second peak is greater than or equal to 0.30.

The court has held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also MPEP 2112 and 2112.01. When the Examiner has provided a sound basis for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990)

8. Claims 7-9, 11-14, and 16-18 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Barker et al. (US 6,528,033 B1) and as evidenced by the CRC Handbook of Chemistry and Physics, 84th Edition, CRC Press, LLC 2004, p. 4-63).

Barker et al. discloses all the limitations of claims 7-9, 11-14, and 16-18 (see above) except explicitly disclosing that the ferric phosphate is a hydrate where n is interpreted by the Examiner to be greater than zero since applicant did not define the values for n.

The CRC Handbook of Chemistry and Physics discloses that iron (II) phosphate with chemical formula $\text{Fe}_3(\text{PO}_4)_2$ is a hygroscopic compound (denoted by the abbreviation hyg on page 4-63). Because of its hygroscopic property, Iron (II) phosphate adsorbs water and would inherently exist in a hydrated form where $n > 0$, especially as ferric phosphate octahydrate as shown on page 4-63 of the CRC Handbook.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 7-9, and 11-14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4 and 10 of copending Application No. 09/961,895 in view of Barker et al. (US 6,528,033 B1).

The difference between claims 4 and 10 of the copending application and instant claims 7-9, and 11-14 is that claims 4 and 10 of the copending application do not recite that the carbon material in cathode active material is not less than 3 wt%, and that the carbon material satisfies the condition that the ratio of peak area appearing from 1350 cm^{-1} to 1360 cm^{-1} to the peak area appearing from 1570 cm^{-1} to 1590 cm^{-1} in the Raman spectrum is greater than or equal to 0.30.

Barker et al. teach a battery comprising a cathode comprising 85 wt% LiFePO_4 , 10% by weight carbon black and 5% by weight binder where the carbon black inherently has a Raman spectrum characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1}

such that the ratio of the peak area of the first peak to the peak area of the second peak is greater than or equal to 0.30 for reasons give above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add 10% by weight carbon black having a Raman spectrum that is characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1} such that the ratio of the peak area of the first peak to the peak area of the second peak is greater than or equal to 0.30 to the cathode recited in claims 4 and 10 of the copending application because this amount of carbon black having a Raman spectrum that is characterized by having a peak at 1350 to 1360 cm^{-1} and a peak at 1570 to 1590 cm^{-1} such that the ratio of the peak area of the first peak to the peak area of the second peak is greater than or equal to 0.30 is effective for increasing the electrical conductivity of the cathode which improves battery performance.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

11. Applicant's arguments filed 5/17/2004 have been fully considered but they are not persuasive.

With respect to the obviousness type double patenting rejections based on copending application 09/961,895, applicant asserts on page 6 of the amendment that the application does not disclose a method wherein lithium phosphate and iron phosphate hydrate (the chemical formula $(\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O})$ is not a hydride, it is hydrate) are used as starting material for

synthesis of Li_xFePO_4 . In response, claims 4 and 10 of the copending application specifically recite these limitations.

12. Applicant's arguments with respect to claims 7-9, 11-14, and 16-18 based on Barker et al. (US Patent No. 6,528,033) have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed on 5/17/2004 with respect to art rejections based on Barker et al. in the previous office action are moot in view of the new grounds of rejection given above.

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ *Susy Tsang-Foster*

Susy Tsang-Foster
Primary Examiner
Art Unit 1745